



Cinders Nursery-Phase 2

Yapton

SuDS Operations & Maintenance Manual

Prepared by:

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KNC2006/SUDS/A

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Prepared by Kazys Narbutas Signed: 
BSc (Hons) CEng
MICE, MCIHT, AaPS Date: 25th October 2020

Revision	Description	Date	Initials
O	Initial issue	October 2020	KHN
A	Permeable paving and updated drainage and Hydro Brake details added	13.01.21	KHN

1.0 INTRODUCTION

1.1 The SuDS Philosophy

1.2 Sustainable Drainage Systems (SuDS) are a collection of water management practices that aim to align modern drainage systems with natural water processes. SuDS are designed to mimic the natural drainage regime of an area thus minimising impact on receiving watercourses. The SuDS philosophy has been applied to the proposed development to provide a natural approach to managing the surface water drainage from the site and preventing water pollution and flooding.

1.3 Infiltration testing has been undertaken and showed that the use of soakaways as a means of surface water disposal were not appropriate on this site.

1.4 SuDS Maintenance

1.5 Regular inspection and maintenance is important for the effective operation of the SuDS drainage features across the development.

1.6 The following SuDS features have been designed into the development to control the surface water run-off created through the construction of impermeable areas such as roofs, drives and roads and for the collection of surface water falling on permeable carriageway construction.

- Attenuation Storage and Flow Control Device
- Permeable Pavements (block paving)

1.7 In order to ensure the continued effective operation of the SuDS features maintenance regimes have been provided for the above features.

- 1.8 This document has been prepared at the design stage and should be considered as part of an evolving process. Following construction as built information and drawings should be included. The post construction information should include drawings detailing the extent and location of SuDS features together with relevant manufacturer's details.
- 1.9 The following maintenance regimes should be amended/updated to suit specific manufacturer's requirements for the various components installed.
- 1.10 The following appendices have been included to allow for additional information and records to be included post construction.
- **Appendix A** As built Information
 - **Appendix B** Manufacturer's '*Hydro-Brake*' Information
 - **Appendix C** Inspection Records
 - **Appendix D** Maintenance Regime Monitoring and Amendments
- 1.11 It should also be recognised that for a maintenance regime to continue to be appropriate and fit for purpose a constant monitoring ethos should be adopted and any corrective measures implemented to ensure that the correct maintenance regimes going forward are in place. Inspection records should be kept and used as a basis for the determining the suitability of the maintenance regimes and the areas of the development requiring attention.
- 1.12 As a reputable developer Crayfern Homes will set up a Maintenance Management Company for the site which will undertake the requirements and obligations to ensure that the SuDS facilities are adequately maintained. The obligations of the Management Company will be funded by an annual contribution from the residents of the development. This manual will form part of the brief provided to the

Management Company, who will use it to calculate fees which will be paid by residents.

- 1.13 If the Management Company were to become insolvent or was dissolved then any former director or member of the company (which would in this case be the residents) can either apply to Companies House to get the Management Company restored or make a court application to do the same. Either option can be undertaken within 6 years from the date of dissolution of the company. The process would also involve applying to the Treasury Solicitor to give up their interest in the land (as assets of dissolved companies pass to the Crown).

Wording in the estate transfer will advise that if the management company was dissolved or struck off then the residents can join together in arranging for the estate service to be carried out, subject to each resident making a contribution. At the same time as doing this the residents can agree what course of action they wish to take with the dissolved company i.e. apply to Companies House or Court to restore it.

- 1.14 At the end of the manufacturer's recommended design life for all SuDS components they shall be replaced at the Management Company expense.

2.0 PERMEABLE PAVEMENTS

- 2.1 Permeable pavements have been provided around the development for parking areas and access court. These will infiltrate water down through to the granular sub base storage and linked to the granular sub base of the access road where it will be stored and discharged into the '*Hydro-Brake*' flow control through a 'fin drain'. The system will not rely on any infiltration through the sub-strata; all discharge volumes being calculated to be contained in the granular sub-base.
- 2.2 Permeable pavements need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Extensive experience suggests that sweeping once per year should be sufficient to maintain an acceptable infiltration rate on most sites.
- 2.3 A maintenance regime has been prepared for the development as indicated in Table 1 below.
- 2.4 Inspection reports should be kept and the maintenance regime for the permeable paving should be adjusted, if necessary, to suit ongoing site-specific circumstances as they arise.
- 2.5 A brush and suction cleaner (which can be a lorry-mounted device or a smaller precinct sweeper) should be used for regular sweeping. Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material. Any lost material should be replaced. It is also possible to clean the surface using lightweight rotating brush cleaners combined with power spraying using hot water.
- 2.6 If the surface has clogged then a more specialist sweeper with water jetting and oscillating and rotating brushes may be required.

Table 1: Operation and Maintenance Requirements - Permeable Pavements

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance.	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
	Permeable surfaces; power wash	Once a year at the same time as the pervious paving is being cleaned.
Occasional maintenance.	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements.
Remedial Actions.	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required – once per year on less frequently used pavements.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required.
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging).
Monitoring.	Initial inspection.	Monthly for three months after installation.
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48hours after large storms in the first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor silt taps.	At same frequency of permeable paving inspections.

3.0 ATTENUATION STORAGE: CHANNELS & SILT TRAPS

- 3.1 Attenuation storage is provided within the granular sub base of the access road and access court. All discharge from roofs, drives and impermeable carriageway passes through a silt trap or trapped gully before being discharged into the granular sub base through a 'diffuser'. Access court and visitor parking drainage passes through the permeable paving directly into the granular storage.
- 3.2 Maintenance of the silt traps and gullies is particularly important as these control the flow surface water into the 'diffusers'
- 3.3 The granular attenuation storage will be wrapped in an impermeable membrane which will contain the surface water prior to discharging through the flow control into the receiving watercourse.

Table 2: Operation and Maintenance Requirements –Attenuation Storage and Silt Traps

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance.	Inspect and remove sediment from all channel drains, silt traps and gullies	At six monthly intervals, Autumn and Spring
Remedial actions.	Inspect and clean out all channel drains, pipework, silt trap manholes and gullies.	At six monthly intervals, Autumn and Spring.
Monitoring.	Inspect/check all inlets, outlets and overflows to ensure that they are in good condition and operating as designed.	Annually

4.0 FLOW CONTROL DEVICE

4.1 The granular attenuation system connects to a 'fin drain' which is connected to a manhole containing a flow control device which limits the rate of discharge into the ditch network.

4.2 The flow control device being used:

- A vortex control, Hydro International '*Hydro-Brake*' or similar, fitted to the outfall structure from the granular storage which will limit the final flow from the site to 2.0 lits/sec
- Manufactures details can be found in **Appendix B**

4.3 The vortex control manhole is connected to a headwall which discharges into the ditch.

4.4 A maintenance regime has been prepared for the flow control device as indicated in Table 3 below and should be read in conjunction with Hydro International recommendations.

Table 3: Operation and Maintenance Requirements - Flow Control Device

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance -In conjunction with Hydro International maintenance recommendations in Appendix B	Inspect and identify any areas that are not operating correctly, take remedial action.	Monthly for 3 months, then half-yearly.
	Remove any sediment and debris from flow control devices	As required
Remedial actions.	Repair/rehabilitate inlets, outlet, overflows and vents.	As required.
Monitoring.	Inspect/check all inlets, outlet, and overflows to ensure that they are in good condition and operating as designed.	Monthly for 3 months, then half-yearly.

5.0 DITCH & HEADWALL

- 5.1 Surface water from the granular storage discharges through the vortex control into the adjacent ditch network, through a headwall constructed into the bank.
- 5.2 Maintenance of the ditch and headwall is relatively straight forward and typically requires only a small amount of work.

Table 4: Operation and Maintenance Requirements for Ditch & Headwall

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance. -Including access to ditch network	Remove litter and debris.	Monthly, or as requested.
	Cut grass	Monthly (during growing season), or as required.
	Manage vegetation and remove growth.	Monthly at start, then as required.
Headwall	Inspect headwall outlet for blockages, and clear if required.	Half yearly
	Inspect headwall for damage and undertake appropriate repairs.	Half yearly

Appendix A

As Built Information

[illegible][illegible]

F	15.01.21	Franchise agreement to warehouse, docks and routes to 8, 19 added
E	13.03.21	Additional information added; 2, 18 & 19 surface damage awarded
D	14.03.21	Scatlet for 8th analysis for added
C	23.03.21	Delivered delay
B	23.03.21	Adjusted for raised input
A	28.03.21	First issue
Rev.	Date	Details

PRELIMINARY-FOR CONSTRUCTION

Project:
CINDERS NURSERY: Phase 2
YAPTON

Chenel
Crayfern
HOMES

Drawing Title		Revision		Date	
Engineering Details		1/280		01/01/2016	
Drainage Layout		A1		F	
Drawn	Checked	Scale	Page Size		
KAC		1/280	A1		
Project No.	Drawing No.	Drawing Scale			
KNC2006	502-01	502-01			

Appendix B

Manufacturer's Information

Hydro International Warranty, Maintenance and COSHH Statement

This statement covers all Hydro International Hydro-Brake[®] Optimum, Hydro-Brake[®] and S-Type Vortex Flow Control units (hereafter referred to as "Flow Control").

Defects Liability Period Warranty

The standard Hydro International warranty covers products for one year from date of purchase and will only be considered for those defects or faults reported directly to Hydro International in writing. Warranties will not be considered for defects or faults caused by accident, acts of vandalism or unauthorised repair/rectification. Please Contact Hydro International for product specific details.

Maintenance

Normally, little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. The Flow Control (where applicable) is fitted with a pivoting bypass door, which allows the manhole chamber to be drained down should blockage occur. The smaller conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

Following installation of the Flow Control it is vitally important that any extraneous material ie. building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced, please do not hesitate to contact the company so that an investigation may be made.

All Flow Control units are typically manufactured from grade 304 Stainless Steel, and if required they can also be manufactured in grade 316 Stainless Steel. Both materials have an estimated life span in excess of the design life of drainage systems.

COSHH

Flow Control units are manufactured from Stainless Steel, which is not regarded as hazardous to health and exhibits no chemical hazard when used under normal circumstances for the stated applications.

Manual Handling

The handling of Flow Control units should be in accordance with the current legislation and regulations:

- The Health and Safety at Work Act 1972
- The Management of Health and Safety at Work Regulations 1999
- The Manual Handling Operations Regulations 1992. All published and printed by the Health and Safety Executive.

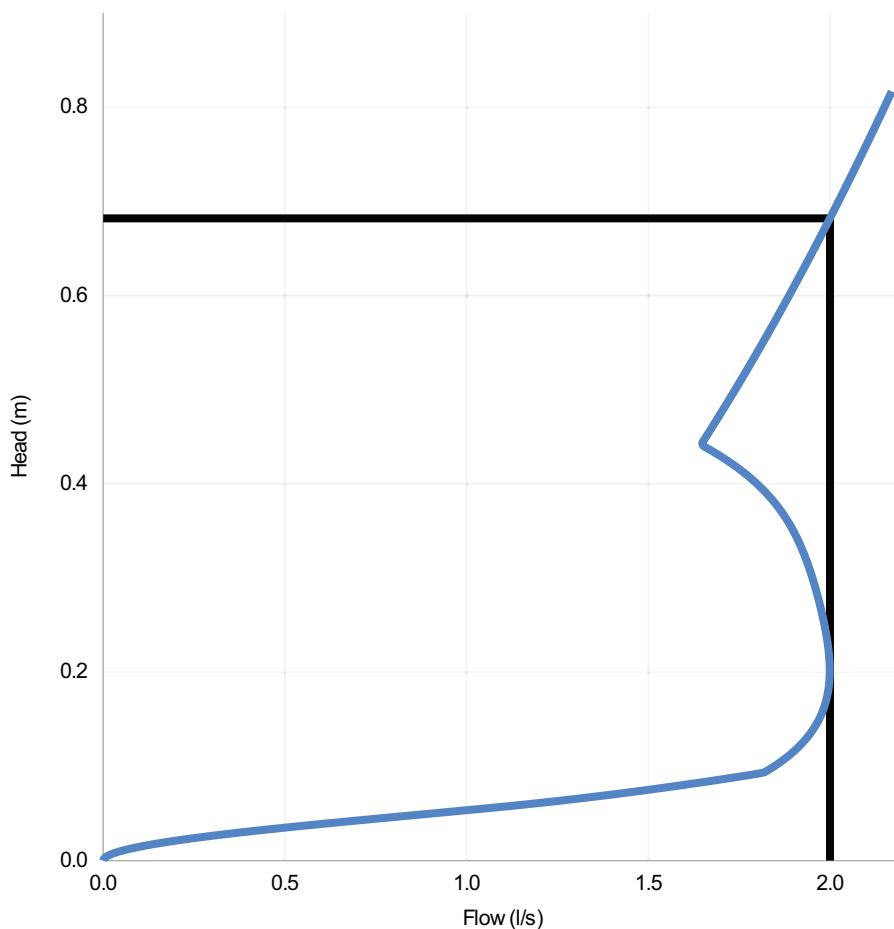
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	0.682	2.000
Flush-Flo	0.202	1.999
Kick-Flo®	0.441	1.644
Mean Flow		1.739



PT/329/0412

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.024	0.243
0.047	0.822
0.071	1.408
0.094	1.821
0.118	1.905
0.141	1.957
0.165	1.985
0.188	1.998
0.212	1.999
0.235	1.992
0.259	1.980
0.282	1.965
0.306	1.947
0.329	1.925
0.353	1.895
0.376	1.856
0.400	1.800
0.423	1.723
0.447	1.654
0.470	1.692
0.494	1.729
0.517	1.766
0.541	1.801
0.564	1.836
0.588	1.870
0.611	1.904
0.635	1.936
0.658	1.968
0.682	2.000

DESIGN ADVICE



The head/flow characteristics of this SHE-0072-2000-0682-2000 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International

DATE	12/01/2021 08:28
Site	19_21_5806 Cinders Nursery Yapton
DESIGNER	
Ref	HQT-072088

SHE-0072-2000-0682-2000
Hydro-Brake Optimum®

Technical Specification

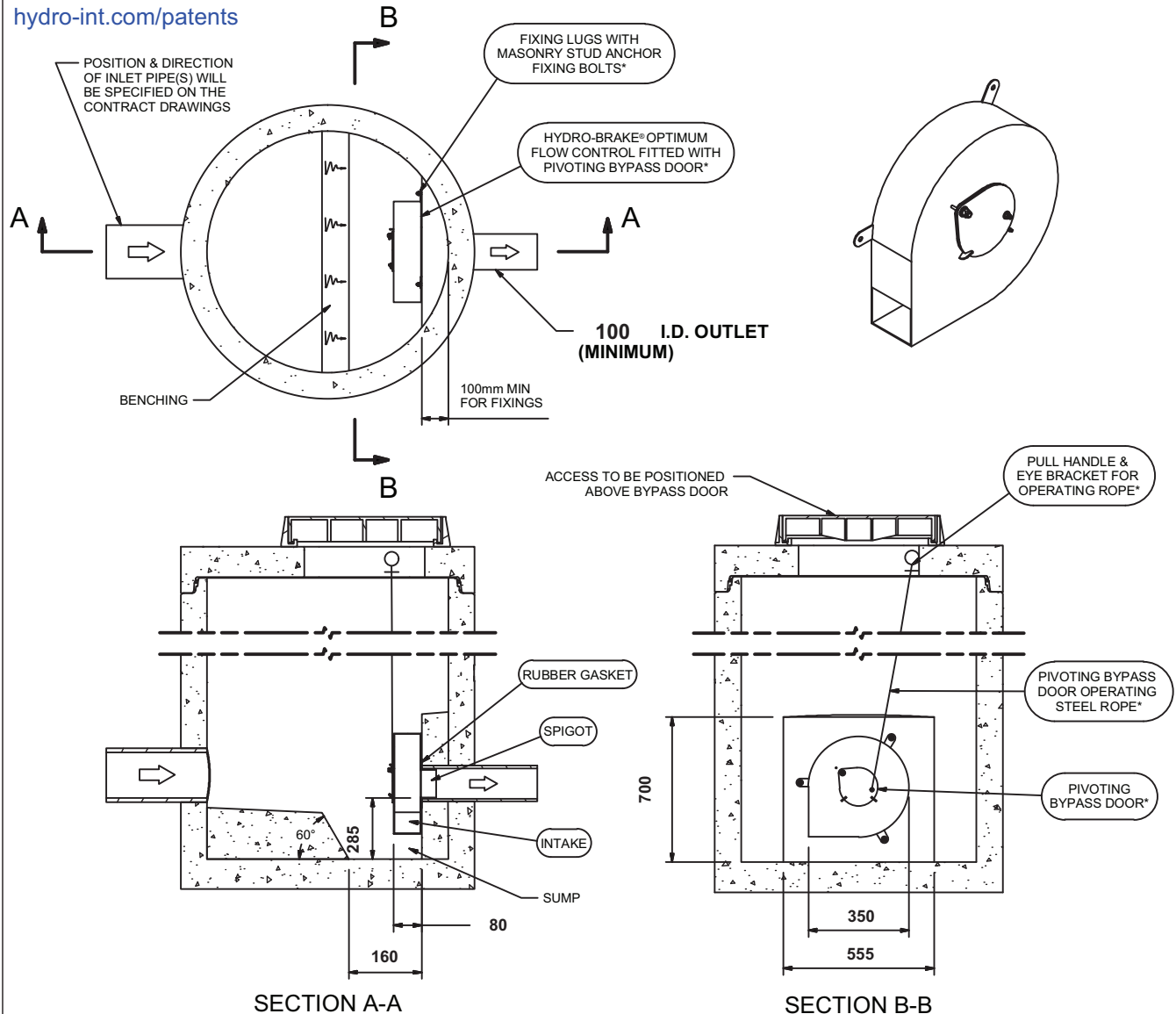
Control Point	Head (m)	Flow (l/s)
Primary Design	0.682	2.000
Flush-Flo™	0.202	1.999
Kick-Flo®	0.441	1.644
Mean Flow		1.739

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



hydro-int.com/patents



IMPORTANT:

○ LIMIT OF HYDRO INTERNATIONAL SUPPLY

THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS

* WHERE SUPPLIED

HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SHE-0072-2000-0682-2000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International®

DATE	1/12/2021 8:28 AM
SITE	19 21 5806 Cinders Nursery Yapton
DESIGNER	
REF	HQT-072088

SHE-0072-2000-0682-2000
Hydro-Brake® Optimum

Appendix D

Maintenance Regime Monitoring & Amendments

Monitoring and Review Table

Revision	Revision Description	Date	Initials

Appendix C

Inspection Records